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# Evaluation of early surgical management of complicated appendicitis by appendicular mass

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ABSTRACT

*Aim:* This prospective study was done to evaluate the feasibility and safety of immediate appendicectomy in the presence of appendicular mass.

*Methods:* A prospective, nonrandomized study was conducted over 46 consecutive patients (mean age: 24 ± 8.76 years) presenting with an appendicular mass over a 4-year period. They were subjected for immediate appendicectomy within 24 h of admission.

*Results:* The appendix was identified and removed in all 46 patients at operation. Peri-appendiceal abscesses were present in 25% (11 of 46). There was difficulty with adhesolysis and localization of the appendix in 10%(4) of patients. Superficial wound infection had occurred in 8(17%) while deep wound infection had occurred in 9%(4) patients. The mean hospital stay was 3 ± 0.25 day. No major complications had occurred.

*Conclusions:* Early surgical intervention in patients with an appendicular mass is feasible, safe and avoids the consequences of the misdiagnosis and mistreatment of other surgical pathologies.



## 1. Introduction

Acute appendicitis remains the commonest cause of acute abdomen in teenagers requiring surgical intervention. Most patients presenting late in the course of acute appendicitis are complicated by the development of an inflammatory mass in right iliac fossa. This inflammatory mass is composed of the inflamed appendix, omentum and bowel loops.[1]

The treatment of this appendicular mass is controversial and there are several management options.[2]

Traditionally, those patients are managed conservatively followed by interval appendicectomy 4–6 weeks later, believing that an early appendicectomy in these cases is hazardous, time consuming and may lead to life threatening complications such as faecal fistula.[3]

Others prefer an operative intervention, including the drainage of the mass and conservative treatment, and later an interval appendicectomy depending on the results of colonoscopy or barium enema which could help in excluding other underlying lesions.[4]

Some authors advocate a definite operative intervention during the primary admission. Studies favoring immediate appendicectomy claim an early recovery and complete cure during the same admission, avoiding the need for readmission for interval appendicectomy and immediate exclusion of other pathology.[5,6]

## 2. Patients and methods

This study was conducted from January 2005 to January 2009. Inclusion criteria include patients diagnosed to have acute appendicitis which is complicated by appendicular mass (diagnosed by clinical examination, abdominal ultrasound examination or accidentally encountered during appendectomy). Patients either come to our hospital directly or referred from other hospitals. Forty six (46) patients with appendicular mass were included in this study (41 patients came to the hospital directly and 4 patients referred to the hospital after a trial of conservative treatment for their problem in another hospital for a duration ranged from 2 to 5 days).

The symptoms of the patients were right lower abdominal pain and anorexia in all patients while vomiting, fever, abdominal distension and constipation were present but not in all patients. These symptoms ranged from 4 to 12 days in duration. On admission, all of patients were clinically evaluated and a palpable mass was detected in 35 from 46[76%] patients. Subsequent investigation with blood chemistry and abdominal ultrasound.

Diagnosis of appendicular mass was either clinical [35 from 46 (76%) patients], ultrasound of abdomen which confirmed the clinical examination and detected appendicular mass in another 6(13%)

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patients and appendicular abscess in 4 patients from patients diagnosed with appendicular mass. In the remaining 5(11%) patients, the mass was detected intra-operative.

Patients underwent operation within 24 h of admission after preliminary investigations. The operation was explained to every patient and informed consent was taken from each patient.

Open or laparoscopic approach was used. The laparoscopic approach was used in patients in who mass was detected by ultrasonographic examination only or the procedure was planned from the start for laparoscopic appendectomy and the mass was detected intra-operative. The peritoneal cavity was accessed using the open technique, with sub umbilical insertion of a 10 mm trocar. Two additional 5 mm trocars are inserted in the supra-pubic and left iliac fossa regions. A careful dissection is employed to release the appendix from adherent omentum or loops of bowel, using a blunt non traumatic instrument and ultrasonic dissector which was also used to divide the mesoappendix. The appendix was divided at the base after two endoloop application and extracted through the umbilical port with removal of the trocar itself with the appendix to avoid direct contact with subcutaneous tissue and umbilical skin. Copious irrigation with warm saline and adequate suction was then undertaken.

The open procedure through McBurney incision was used for patients diagnosed with appendicular mass both by clinical and by ultrasonographic examination. Dissection of the inflammatory mass from the surrounding healthy tissues and appendicectomy was done. If pus was detected, a copious lavage and irrigation of the peritoneum was performed.

A drain was inserted around the area of the mass and into the pouch of Douglas in all patients. Patients started oral fluids after 24 h and discharged from the hospital after 2–4 days. The drain was removed during the hospital stay in all patients except 4 patients with appendicular abscess in whom the drain removed during the period of follow up in the outpatient clinic. Antibiotics were given IV during the hospital stay (third generation cephalosporins 1g m BD and metronidazole 500 mg was added if pus was found) and then oral continuation of the antibiotics till the time of stitch removal. After 2 months patients were seen in follow up.

The evaluation included operative complications, operating time, post-operative complications and hospital stay.

## 3. Results

In this study, 46 patients were included (31 male and 15 female), their ages ranged from 12 to 48 years with the mean age was 24 ± 8.76 years. The incidence of appendicular mass is significantly higher in males than females ($p$ value $< 0.005$).

A McBurney incision was used in 35 patients and laparoscopic approach in the remaining 11 patients. Conversion from laparoscopic to open procedure occurred in 4 patients due to difficult dissection and fear of complications and conversion from McBurney incision to midline incision occurred in one patient as this patient had a cancer of the ceacum and right hemi-colectomy was performed. This patient was excluded from the study. The operative time ranged from 50 min to 120 according to the approach used with the mean operative time 72 ± 18.56 min (Table 1).

**Table 1**
surgical approaches and their operative time.

| | Total No. | Range | | Mean ± SD | Total Mean ± SD |
|---|---|---|---|---|---|
| | | Minimum | Maximum | | |
| McBurney approach | 34 | 50 min | 80 min | 65 ± 11.43 min | 72 ± 18.56 min. |
| Laparoscopic approach | 7 | 65 min | 100 min | 85 ± 22.65 min | |
| Combined approach | 4 | 85 min | 120 min | 95 ± 6.65 min | |

**Table 2**
operative findings and post-operative complications.

| | | |
|---|---|---|
| Operative finding | Simple mass | 34 (75%) |
| | Pus collection | 7 (15%) |
| | Appendicular abscess | 4 (10%) |
| Operative complications | Need to extend incision | 11(26%) |
| | Difficulty in localization of appendix | 4 (10%) |
| | Difficulty in adhesolysis | 4(10%) |
| | Serosal tear to bowel | 3 (7%) |
| | Intestinal perforation | 0 (0%) |
| Post-operative complications | Superficial wound infection | 8(17%) |
| | Deep wound infection | 4(9%) |
| | Residual abscess | 0(0%) |
| | Intestinal or feacal fistula | 0(0%) |
| | Incisional hernia | 3(7%) |

### 3.1. Operative finding

Simple appendicular mass formed of bowel loops and omentum without pus formation was detected in 34 (75%) patients while localized pus collection in the mass was detected in 7 (15%) patients and frank appendicular abscess was detected in 4 (10%) (Table 2).

### 3.2. Operative problems

There was a need to extend McBurney incision by cutting muscle as the mass was large in 11(26%) patients. The appendix was removed in all patients but it was difficult to easily identify the appendix in 4 patients (10%). The adhesolysis was performed by blunt dissection to reach the appendix as most adhesions are fibrinous and not tough. Difficulty in adhesolysis was experienced in 3(7%) patients. A serosal tear to the terminal ileum or the ceacum during dissection to reach the appendix occurred in 3(7%) patients with difficult adhesolysis but no cases with intestinal perforation occurred (Table 2).

### 3.3. Post-operative complications

Superficial wound infection (skin and subcutaneous tissue) had occurred in 8(17%) while deep wound infection (including the muscle) occurred in 4(9%) patients whom their operative finding was appendicular abscess. No cases developed intestinal or feacal fistulae or post-operative residual abscess. Follow up of the patients revealed that 3 (7%) patients, who had deep wound infection, developed incisional hernia (one patient after 5 months, another patient after 7 months and the third patient after 12 month) (Table 2).

The duration of hospital stay ranged from 2 to 4 days with the mean hospital stay was 3 ± 0.25 day.

## 4. Discussion

The non-operative management of patients presenting with an appendicular mass is not always successful. Authors estimate that approximately 10–20% of such patients fail to respond and require a delayed and potentially more difficult appendicectomy with a possible laparotomy and bowel resection. Moreover, approximately50% of patients may suffer a recurrence of their appendicitis/appendicular mass following discharge from hospital.[2]

A large number of patients refuse readmission for operation once their acute problem is solved and this is a major disadvantage of the initial conservative approach. Another disadvantage of the conservative management is the chance of misdiagnosis (15%) as

conditions such as intussusception and carcinoma of the caecum may be treated conservatively by mistake adding considerable morbidity.[2,7]

The conservative treatment comprises hospitalization, intravenous fluids, antibiotics, analgesics and a strict watch on the vitals and general state of the patient.[8] Also in about 50% of patients managed conservatively, the appendix is totally destroyed or atrophied (fibrosis) with obliterated lumen of the appendix so no risk of recurrent acute attack and nothing else needed to have been done in those patients.[5]

Early appendicectomy clearly avoids these difficulties and enables a one-admission treatment. Also early surgical intervention is known to be an effective alternative to conservative therapy as it considerably reduces the total hospital stay and obviates the need for a second admission. This substantially reduces the total expenses.[1,2,7]

The results in this study are comparable to the results of the study by Samuel et al,[9] in which 34 patients, underwent an appendicectomy at presentation (9 patients did not respond to nonsurgical management and 25 patients subjected from the start to surgical interference), All 34 patients had a fixed appendicular mass with peri-appendiceal abscesses and adhesions. All 34 (100%) patients had an identifiable appendix at operation. Mean length of hospital stay after appendectomy was 4.8 $\pm$ 0.4 days. They all received intravenous antibiotics for 4.8 $\pm$ 0.4 days and completed a 5-day course by oral medication. Three wound infections were treated with oral antibiotics, and one needed drainage under general anesthesia. No other post-operative complications or significant sequelae were seen after early open appendicectomy.

Samuel et al.[9] stated that surgical intervention was beneficial over non-operative management in their cohort of patients. Oedema and friability of the tissues did not affect the outcome in those treated with early surgical intervention, and this is a result of careful and meticulous technique adopted at laparotomy. Also he stated that the persistence of adhesions at interval appendicectomy was significant in the group managed by non-operative treatment of appendiceal mass followed by interval appendectomy.

In the study of Malik et al.[1] the operative time and the hospital stay were significantly shorter in the group treated by immediate appendicectomy than the group treated conservatively followed by interval appendicectomy. Malik et al.[1] reported no significant difference between both groups in relation to wound infection. Malik et al.[1] stressed the feasibility and effectiveness of early appendicectomy in the presence of appendicular mass and their results were consistent with a number of similar studies as Ghosh et al.[11] and Samuel et al.[9]

Okune et al.[5] in their study on the group treated by early surgical interference for appendicular mass recorded that: the operation time was about 50 min on the average and wound suppuration occurred in 3/11 patients = 27.3%. No bowel injury or feacal fistula occurred. Okune et al.[5] recorded lower rate of wound infection in the group treated by the traditional approach but two cases of misdiagnosis were recorded, namely a mucinous adenocarcinoma of the appendix and an appendiceal carcinoid tumour.

Erdogan et al.[10] reported in his study: in the group of patients who were operated on immediately, 5 of the 19 (26.3%) had various complications during the operation or the post-operative period. In the Erdogan et al. study, there were two cases of ileal perforation and an appendectomy could not be performed in one patient because of extensive adhesions. An intra-abdominal abscess developed in the fourth patient. In the light of their experience Erdogan et al. recommended conservative treatment followed by elective appendectomy in patients with an appendix mass. Erdogan et al. stated the most important criteria for immediate operation were a failure to respond to medical treatment and suspicion of malignancy.[8]

Operative problems such as localization of appendix, adhesolysis and bleeding are more pronounced and troublesome with interval appendicectomy in the study of Erdogan et al, wound infection, however, remains common post-operative complication of early appendectomy in appendicular mass but the rate of wound infection is not so high as to preclude this early operative approach. Our results demonstrated that the benefits of early appendectomy overweigh the results of interval appendectomy and this view is supported by many other studies.[1]

## 5. Conclusion

Early surgical interference during the first admission of patients with an appendicular mass is feasible, safe and avoids the consequences of the misdiagnosis and mistreatment of other surgical pathologies, such as carcinoma of the ceacum.

*Conflicts of interest*

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*Ethical approval*

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